CLIMATE PROGRAM OFFICE

Climate Prediction Program for the Americas

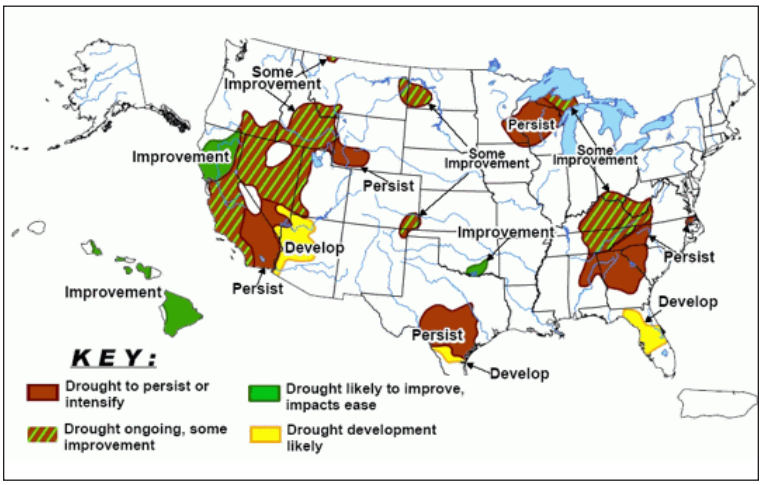
Can climate scientists improve predictions of hurricanes, flooding, or severe winter storms in coming months, seasons, or years?

What do cool waters in the eastern Pacific Ocean during La Niña conditions have to do with drought in the southern parts of North America?

The Climate Prediction Program for the Americas (CPPA) mission is to improve near-term climate predictions and hydrological outlooks in North, Central, and South America. The Program supports predictability and process studies of phenomena such as El Niño, La Niña, the North American Monsoon, and droughts. CPPA works to improve predictions by supporting the development of climate models and climate-based applications such as water resources management.

CPPA Objectives

- Quantify the sources and limits of predictability of climate variations on intra-seasonal to inter-annual time scales.
- Improve predictive understanding and model simulations of ocean, atmosphere, and land-surface processes, including the ability to quantify uncertainty.
- Advance NOAA's operational climate forecasts, monitoring, and analysis systems by transferring research to operation.
- Develop climate-based hydrologic forecasting capabilities for decision support and water resource applications.



U.S. Seasonal Drought Outlook maps are issued by the Climate Prediction Center, part of NOAA's National Centers for Environmental Prediction.

Approaches

CPPA projects study complex interactions between the ocean, atmosphere, and land to improve climate models and predict droughts and extreme precipitation events. The program also supports research that enhances operational climate forecast products for drought and water availability.

CPPA supports research to improve the predictability of phenomena such as the North American Monsoon. This involves research on fundamental mechanisms of climate variability including the El Niño Southern Oscillation and the Madden-Julian Oscillation. This research is carried out through field experiments, data analyses, and related model studies, with emphasis on improving understanding and climate model representation of air-sea and land-atmosphere interactions. Key research questions regarding land-atmosphere interactions address the roles of soil moisture, snow, vegetation, and topography. The North American Monsoon Experiment and Variability of the American Monsoon Ocean-Cloud-Atmosphere-Land Studies are major programs involved in this research.

Climate Prediction Program for the Americas http://www.cpo.noaa.gov/cpo_pa/cppa

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Approaches (continued)

CPPA research also enhances drought monitoring and prediction products and the Global Monsoon Monitor. Development and implementation of the Land Data Assimilation System represents a major effort to improve operations at the National Centers for Environmental Prediction. This research-to-operation transition is implemented through support of joint university-NOAA research teams.

Research supported by CPPA is also developing applications for water and ecosystem management by translating seasonal climate forecasts into hydrologic and ecosystem predictions. This research involves the development of methodologies to correct biases, downscale climate predictions, and account for uncertainties in application models. The Hydrological Ensemble Prediction Experiment is among the CPPA-funded research activities working to improve hydrologic prediction.

R. Wood

Cumulus clouds over the Southeast Pacific during the VOCALS REx campaign.

CPPA Highlights

Drought monitoring and predictions

CPPA-funded drought research and model development projects such as the Experimental Seasonal Hydrologic Prediction System are contributing to improved drought monitoring and predictions and to the National Integrated Drought Information System (NIDIS). Currently, the U.S. Drought Monitor and Seasonal Outlook are the main drought communication products. These products, available online at http://drought.gov, have been successful and popular, but could be improved by providing more quantitative information as part of a drought early warning system.

Drought can have immense societal and economic impacts. The direct annual losses to the U.S. economy due to droughts are estimated to be $6–$8 billion. The lack of prompt and comprehensive preparation and response to droughts is due in part to the lack of proper recognition of drought development. Unlike other natural disasters, droughts develop slowly over large areas and over an extended period of time, making it difficult to identify them until they have become severe. Therefore, accurate quantitative assessment of drought conditions and the prediction of the onset, duration, and recovery of droughts in real-time are critical for drought mitigation.

VOCALS-REx Field Campaign

Late in 2008, 150 scientists from 40 institutions in 8 nations took part in the Variability of the American Monsoon Systems' Ocean-Cloud-Atmosphere-Land Study Regional Experiment (VOCALS-REx). This international field program is designed to gather observations of critical components in the climate system of the southeastern Pacific that are poorly understood and poorly represented in global climate models. The region is dominated by strong upwelling of deep ocean water along the western coast of South America and extensive areas of cold sea surface temperatures. It is home to the largest persistent deck of stratocumulus clouds on Earth. This cloud structure plays a large role in moderating the planet's energy balance by reflecting sunlight and trapping heat. The campaign focused on processes that control the properties of stratocumulus clouds, the ocean transport of cold freshwater offshore, and chemical and physical interactions between the lower atmosphere and upper ocean. The research will improve understanding, model simulations, and predictions for climate and water availability not only in South America, but for the entire globe.